Excelsior
MINING CORP

January 2, 2018

U.S. Environmental Protection Agency, Region 9
Drinking Water Protection Section, Mail Code WTR-3-2
75 Hawthorne Street
San Francisco, CA 94105

Attention: Nancy Rumrill

Dear Ms. Rumrill:

Excelsior Mining Arizona, Inc. (Excelsior) appreciates the opportunity to comment on the draft Underground Injection Control (UIC) Permit for the Gunnison Copper Project. Our comments, provided below, are generally designed to make the permit conditions consistent with the Aquifer Protection Permit (APP).

1. **Part II.F.1—Monitoring Program**

   - As an alternative to the draft permit's requirement for installation of three additional observation well (OW) pairs on the eastern boundary (OW-10, OW-13, and OW-19), Excelsior proposes that the associated HC wells (HC-10, HC-13, and HC-19) be installed prior to Block 1 operations (in addition to operating [pumping] wells HC-15, HC-17, and HC-18). Monitoring of HC-10, HC-13, and HC-19, in conjunction with monitoring of intermediate monitor wells (IMWs), will provide an early warning should mine impacted water approach the eastern boundary of the wellfield.
   - We request some flexibility in the sampling method for ambient groundwater quality. The draft permit says that 3 wellbore volumes shall be purged before collection of water samples from the HC wells for SC and other Level 1 parameter data. ADEQ allows the use of hydrasleeves and other non-purging methods, and Excelsior would like the option to employ such sampling methods.
   - Under this proposed revision, HC-10, HC-13, and HC-19 would be monitored similar to HC wells along the southern boundary. Pumping could be initiated at these HC wells if specific conductance (SC) monitoring in outer IMWs and/or these HC wells indicates approaching mine-impacted solutions. Associated OWs would be installed when this condition occurs and is verified. This change to the

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draft permit will allow (1) a consistent approach to monitoring containment at the southern and eastern boundaries of the wellfield, and (2) will allow an immediate response (pumping of HC wells) in the event of Alert status.

- One element of the Best Available Demonstrated Control Technology (BADCT) presented in the APP and in the UIC application is conservation of the water resource (see the Arizona Mining BADCT Manual, ADEQ, 1998). Demonstrating an inward gradient at the OW-10, OW-13, and OW-19 well pairs in Year 1 cannot be achieved without pumping the associated HC wells. Modeling indicates that pumping of these HC wells is not necessary to control the mining solutions in the first few years of operations. Particle tracking for Year 1 of operations (Figure 1) shows that particles started just outside Mine Block 1 travel a very limited distance during the first year. Hydraulic control pumping at HC-10, HC-13, and HC-19 to maintain an inward gradient would be wasteful of the groundwater resource. Our proposed plan (above) to monitor for SC in HC-10, HC-13, and HC-19 is more conservative of the water resources and allows for a quick response time should monitoring indicate action is required.

Excelsior proposes the following revised verbiage for Part II.F.1:

1. Water Quality Monitoring Wells.

The POC and outer OWs shall serve as water quality monitoring wells beyond the Project wellfield for this permit. In addition, selected injection or recovery wells shall be converted to monitoring wells for water quality monitoring and verification during the rinsing and post-rinsing monitoring periods referred to as rinse verification and closure verification wells. RVW and CVW locations shall be established in accordance with the Wellfield Closure Strategy in Appendix F of this permit. The proposed HC, POC, and water quality monitoring well locations are depicted in Figures A-7A and A-8 of Appendix A, Figure H-2 of Appendix E, and Table P-1 of Appendix I, and are described in Table P-1 in Appendix I. The proposed IMWs, observation, and hydraulic control well locations, stage 2, operation, and activation sequence are listed in Tables 2.5-1, 2.5-2, and 2.5-3 in Appendix A. The proposed activation schedule and sequence for those wells is preliminary and subject to later revision and EPA review and approval as ISR operations for each mine block proceed in Stages 1, 2 and 3.

In addition, any POC wells established for monitoring the effects of injection and natural groundwater movement within the Project AOR, pursuant to a final Aquifer Protection Permit to be issued to the project by the Arizona Department of Environmental Quality, will also serve as water quality monitoring wells for this permit. The water quality monitoring well designs are shown in Figures M-4 and M-5 in Appendix B.

The three proposed HC wells (HC-2, HC-3, and HC-4) located at the southern AE/AOR boundary as depicted in Figure 52 and A-13 (Appendix A) shall be installed prior to commencing ISR operations in year one (1). The Permittee shall monitor specific conductance (SC) and water levels in the three inactive HC wells at the southern boundary and designated

IMWs for alert levels daily. Electric logs shall be run in these wells for baseline electrical resistivity and conductivity profiles in the open hole interval in addition to the other required geophysical logs. Groundwater samples shall be collected for analysis of SC and other Level 1 indicator parameters at least once per month for at least the first year in the HC wells as a backup and comparison to the daily SC monitoring. The SC and water level monitoring in the outer IMWs will serve as an early warning system, which will trigger increased extraction rates from the mine block or existing HC wells at the eastern boundary or activation of more HC wells at the eastern boundary if necessary to regain HC at the southern boundary.

In the event of a verified exceedance of SC levels detected by specific conductance probes or by sampling in the HC wells at the southern boundary, contingency actions shall be implemented immediately. A verified exceedance will require activation of pumping at the HC wells and installation of the three OW pairs, as soon as possible, for inward gradient monitoring and SC monitoring in the outer OWs at the southern boundary.

The Permittee shall install at least three additional HC wells at the eastern boundary prior to commencement of ISR operations in year 1: HC-10, HC-13, and HC-19 as depicted in Figure A-7 and listed in Table 2.5.2 in Appendix A. In the event of a verified exceedance of SC levels detected by specific conductance probes or by sampling in these HC wells at the eastern boundary, contingency actions shall be implemented immediately. A verified exceedance will require activation of pumping at the HC well and installation of the associated OW pair, as soon as possible, for inward gradient monitoring and SC monitoring in the outer OWs at the eastern boundary.

The "redline" version of this section of the draft permit is provided as Attachment 3.

2. **Part II.E.3.a.ii. (A)**: Casing and cementing records are not generally available for all existing test wells and coreholes that will be converted to monitoring wells (IMWs). However, these wells and coreholes will be plugged and abandoned prior to operating the mining block in which they are located or when they are within 100 feet of an active mining block (as required in Part II.D). Therefore, they should be treated like any other existing corehole/borehole, as described in Part II, D.
3. **Table A-1 in Appendix A** is revised to reflect a shift in the location Mine Block 1. The change reflects abandonment of NSD-011 prior to the start of mining because it is inside the new mine block. CS-06 and NSM-001 are changed from outer IMWs to Inner IMWs because of closer proximity. A revised Table A-1 with these changes is attached.

Comments 4-7 below are all related to the well installation schedule.

Footnotes at end of Tables 1 and 2 say: "TBD – To be determined and approved by the director for the five (5) POC wells and the eleven (11) outer observation wells required by EPA prior to the commencement of injection." This footnote is not consistent with the schedule of POC and OW installation. POCs 1, 2, and 3 will be installed prior to Year 1, but POCs 4 and 5 will not be installed until prior to Stage 2 operations (year 10). OWs will be phased in during the course of the project, as shown on the table below, which was prepared in response to a comment by ADEQ for the Aquifer Protection permit. (Please note that the table below lists 10 POC wells, but only 5 are for the wellfield; the other 5 are for ADEQ-regulated impoundments).

Gunnison Project Well Installation Schedule

Stage	Year	Injection and Recovery Wells	Existing Monitor Wells	Hydraulic Control Wells	Point of Compliance Wells	Observation Wells
1	1	38	30	3	3	2
1	2	20	0	2	0	2
1	3	20	0	0	0	0
1	4	17	0	1	0	2
1	5	21	0	3	0	0
1	6	16	0	2	0	2
1	7	18	0	8	0	6
1	8	20	0	0	0	0
1	9	14	0	0	0	0
1	10	16	0	0	0	0
2	-	203	0	0	7	0
3	-	1004	0	11	0	8
Total		1407	30	30	10	22

Excelsior recommends the following revised language: "TBD – To be determined and approved by the director for the POC wells and observation wells required by EPA according to the installation schedules for these wells."

4. **Part II.F.3.a:** This section requires baseline water quality from all POC and outer OWs prior to commencement of injection. As noted in the comment above, OWs will be phased in during the course of mining. POCs 4 and 5 will not be installed until Stage 2 mining. Excelsior recommends the following revised language: "TBD – To be

determined and approved by the director for the POC wells and observation wells required by EPA according to the installation schedules for these wells."

5. **Part II.F.4:** This section says that the five POCs and 11 outer OWs will be monitored for the 23 year mining period and 5 year post-rinsing monitoring period. As noted above, this is not possible. OWs will be phased in during the course of mining and POCs 4 and 5 will not be installed until Stage 2. Excelsior recommends the following revised language: "TBD – To be determined and approved by the director for the POC wells and observation wells required by EPA according to the installation schedules for these wells."

Part II.G.2.c: the verbiage indicates that there will always be 11 pairs of OWs. This is not the case. The OWs will be phased in, as noted in the APP, tables 2.5-2 and 2.5-3 and as discussed above.

6. **Part II.H.1.i:** Excelsior recommends adding "HC wells" to the text. HC pumping volume can also be adjusted to maintain the 101% extraction volume.
7. **Part II.F.6.a.i:** This section should require SC measurements in the IMWs and OUTER OWs (not HC wells). HC wells will be monitored for SC as an operational activity, but they are EXPECTED to have elevated SC as mining approaches the edges of the wellfield. This change makes the verbiage consistent with Part II.E.I.c.
8. **Part II.E.6.d:** Excelsior agrees with the MCL limit for benzene, toluene, ethylbenzene, and xylenes (BTEX) in the injectate sampled monthly and averaged quarterly. However, Excelsior requests that the TPH-DRO limit be removed from the permit, as there is no MCL for TPH-DRO and a limit is not necessary if BTEX concentrations are at or below MCLs.

   In support of this revision, Excelsior has obtained a certificate of analysis for BTEX and other compounds in the diluent, as shown below.

SGS

Date: 02-Oct-2015

Certificate of Analysis: DP15-13351.001

The results shown in this test report specifically refer to the sample(s) tested as received unless otherwise stated. All tests have been performed using the latest revision of the method indicated, unless specifically marked otherwise on the report. Precision parameters apply in the determination of the below results. Users of the data shown on this report should refer to th latest published revisions of ASTM D3244; IP 367 and ISO 4259 and when utilizing the test data to determine conformance with any specification or process requirement. With respect to th UOP methods listed in the report below the user is referred to the method and the statement within it specifying that the precision statements were determined using UOP Method999. Th Test Report is issued under the Company's General Conditions of Service (copy available upon request or on the company website at www.sgs.com). Attention is drawn to the limitation o liability, indemnification and jurisdictional issues defined therein. This report shall not be reproduced except in full, without the written approval of the laboratory. WARNING: The sample(s) to which the findings recorded herein (the "Findings") relate was/were drawn and / or provided by the Client or by a third party acting at the Client's direction. Th Findings constitute no warranty of the sample's representativeness of any goods and strictly relate to the sample(s). The Company accepts no liability with regard to the origin or source from which the sample(s) is/are said to be extracted.

CLIENT ORDER NUMBER :		SGS ORDER NO :	2850336
LOCATION :	Mining Chemicals	PRODUCT DESCRIPTION :	Solvent - Solvent Extraction Diluent
SAMPLE SOURCE :	As Supplied	SOURCE ID :	
SAMPLE TYPE :	As Submitted	SAMPLED BY :	Client
SAMPLED :	--	RECEIVED	01-Oct-2015
ANALYSED :	01-Oct-2015	COMPLETED :	02-Oct-2015

PROPERTY	METHOD	RESULT	UNITS	UNCERT	MIN	MAX
Trace Contaminants in Hydrocarbon Fluids	GCMS SGS BTEX 0002-12					
Benzene		3.4	mg/kg	--	--	--
Toluene		79.3	mg/kg	--	--	--
Ethylbenzene		301.5	mg/kg	--	--	--
Hexane		2.9	mg/kg	--	--	--
Heptane		29.4	mg/kg	--	--	--
Naphthalene		241.9	mg/kg	--	--	--
Xylenes		452.1	mg/kg	--	--	--

** End of Analytical Results **

In addition to the certificate of analysis shown above, Excelsior is providing two laboratory reports of water samples collected from ponds at the Johnson Camp Mine (Attachment 1 and 2 respectively). In each sample of pond water, BTEX compounds were not detected. Therefore, based on prior operations of the Johnson Camp SX-EW plant, it is expected the injectate will contain less than 50 mg/kg of diluent (likely averaging around 25 mg/kg). If the injectate contains 50 mg/kg diluent, then the BTEX concentrations will not approach the MCLs as shown on the table below:

BTEX Concentrations in Diluent and Injectate

Compound	Concentration in pure Diluent (ug/kg)	Concentration in Injectate (ug/Kg) (based on 50 ppm diluent in injectate)	Detection limit (EPA 8260) in ug/Kg	MCL (ug/Kg)
Benzene	3,400	0.17	0.5	5
Toluene	79,300	3.97	0.5	1,000
Ethylbenzene	301,500	15.08	0.5	700
Xylenes	452,100	22.61	0.5	10,000

Based on the low to non-detect concentrations of BTEX projected in the injectate, and the lack of an MCL for TPH-DRO, Excelsior requests that the TPH-DRO analysis be removed from the injectate monitoring requirement.

Part II.E.6

d. During ISR operations, the injectate solution (lixiviant) shall consist of a dilute sulfuric acid solution that includes inorganic and organic constituents as defined below. The lixiviant shall have a pH of approximately 0.6 to 1.8. Organic compounds in the lixiviant shall be limited to those listed in Part II.Section F.7.(a) of this permit. ~~The average total concentration of total petroleum hydrocarbons (TPH) in the lixiviant listed in Part II. Section F.7(a) for each quarter of monthly sampling shall not exceed 10 milligrams per liter (mg/L), unless the permittee demonstrates that a higher TPH concentration would not cause an MCL exceedance in BTEX concentrations.~~ The ~~permittee may request an increase in the TPH limitation if after six months of sampling lixiviant with a higher TPH~~ concentrations of benzene, toluene, ethylbenzene and xylene (BTEX) ~~concentrations are consistently~~ shall be maintained below the MCLs. ~~Should EPA approve an increase in the TPH limit, the increased limit shall be made part of this permit by minor modification procedures (40 CFR §144.41).~~

Excelsior appreciates the opportunity to comment on the draft permit, and we welcome the opportunity to discuss these with you if you wish.

Sincerely,

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